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Enhancing the Growth and Yield of Peachy (Brassica Rapa) Using Different Growth Enhancer Solution

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ABSTRACT: *The study aimed to evaluate the efficacy of different levels of growth enhancer solution on the growth and yield of pechay (Brassica rapa). The study was conducted at La Salud Farm, St. Ezekiel Moreno, Barangay Handumanan, Bacolod City, Negros Occidental last June 2021. The study was laid out in Randomized Complete Block Design (RCBD), consisting of four (4) treatments with three (3) replications. Different levels of growth enhancer solution (GES) treatments were diluted to 1 liter of water before application. The treatments were as follows: T1 – Control (water only); T2 – 2.5 grams of growth enhancers solution; T3 – 5.0 grams of growth enhancers solution; and T4 – 7.5 grams of growth enhancers solution. Data that were gathered were computed and subjected to Analysis of Variance (ANOVA) in RCBD using STAR 2.0.1. The Least Significant Difference (LSD) was used to determine significant differences among treatments. Statistical analysis revealed that applying different levels of growth enhancer solution does not significantly enhance the growth and yield of pechay. Pechay grown under control (water only) obtained the most numbered, longest, and broader leaves, while the highest yield was attained under an application rate of 5.0 grams of growth enhancer solution (T3). Likewise, the lowest total cost of 195.50 pesos was observed in the control group.*

Keywords: *Fertility, fertilizer, growth, growth enhancer, solution, Brassica rapa.*

INTRODUCTION

Vegetables play an important role in meeting people's nutritional needs. Compared to cereal crops, they can produce more than five times the amount of food per unit area. With these impressive characteristics of vegetables, it may be possible to solve the food problems of the nation's insufficiency in food supplies (Dhandevi, et al., 2015).

Pechay (Brassica napus L.), a member of the Brassiceae family, is one of the most well-known vegetables in the Philippines. It is also regarded as one of Asia's earliest green veggies. As a result, it plays a significant part in the Philippine economy and the Filipino people's nutrition.

Pechay is used mainly for its soft, young, yet thoroughly developed leaves. The succulent petioles are frequently chosen. Soups and stir-fried dishes contain it as a primary ingredient. Its green petioles and leaves are sometimes used as a garnish in Chinese cuisine (Gonzales, et al. 2015).

This plant is prevalent in Asia, particularly in the Philippines. It is widely grown due to its ease of cultivation. (Rockets Garden, 2020). Pechay (*Brassica pekinensis L.*) is a green vegetable crop native to the Philippines that belongs to the Cruciferae family.

Vegetables are a significant and vital source of food that adds considerably to the quality of our diet by providing a variety of nutrients. Meals of staple food are delicious because of their flavor and even pleasing to the eyes because of various components of enumerable sorts and vegetables. Vitamins A and C, as well as iron and calcium, are vegetables' most essential nutritional contributions to the human diet (Tagotong, et al. 2020).

As a result, Pechay plays a significant part in the Philippine economy and the Filipino people's diet. The nutritional benefits of pechay are well-known. Calcium is present in a serving of pechay. For strong bones, phosphorus for bone formation, digestion, excretion, and hormonal balance, potassium for muscle control, blood pressure regulation, hypertension prevention, vitamin A for growth, reproduction, and vision improvement, and fiber for excellent digestion. It supports a healthy digestive tract, maintains good blood sugar and cholesterol levels, and helps keep blood pressure in check (Nacua, 2019).

There are different varieties of pechay: Pak Choy Green, Pak Choi Jolly Green Hybrid, Shanghai Pak Choi (Sakata), F1 Hybrid Cherokee (Musashino), and Abaniko (Condor).

In this study, the researchers used the variety of Black Behi because it has a maturity period of 25 – 30 days with dark green leaves and petioles and is grown year-round. It is fast growing with uniform maturity and long, succulent, tender petioles.

Production of native pechay reached up to 47.50 thousand metric tons in 2020, from 47.30 thousand metric tons in 2019. While, Chinese pechay in 2020 went up to 51.39 thousand metric tons, -0.1 percent lower than the 51.45 thousand metric tons output in 2019 (Crops Statistics of the Philippines, 2020).

One of vegetable production's most famous cultural management strategies is fertilizer application utilizing inorganic or organic fertilizer sources. Inorganic fertilizers have been and continue to be used in commercial and subsistence farming to grow crops. This is because they are simple to apply, easily absorbed, and used by plants. However, these fertilizers are thought to play a significant role in human and animal food poisoning, environmental instability, and deterioration (Gonzales, et al. 2015).

On the other hand, according to Aglosolos, Regencia, and Arcilla (2021), organic farming produces nutrient-dense fertile soil that feeds the plants. Water quality and wildlife are protected when chemicals are kept off the land. It also restores depleted soils and keeps fertility levels stable. This makes organic fertilizer more ideal than inorganic fertilizers.

Bandera (2020) even emphasized in his study that vegetable produce from organic fertilizers is safe for human consumption. However, there is a scarcity of information on using organic fertilizers for vegetable production (Aglosolos, et al., 2021).

Foliar fertilization is an essential tool for crop management that is both sustainable and productive. Foliar fertilizers, particularly organic ones, have proliferated in the agricultural fertilizer market recently (Eroy, 2015). It is in deficiency prevention and treatment, significantly when root system function is compromised. This is frequent when the weather has been rainy for a long time and the soils have been saturated. Foliar fertilization is also required when soil conditions, such as low pH, induce nutrient tangles, limiting soil uptake. Foliar fertilization can also target specific growth phases for better vegetable nutrition, resulting in better color, appearance, quality, and yield (Ernest, 2016).

Because of the numerous benefits of foliar fertilizing methods, such as rapid and effective response to plant needs independent of soil conditions, interest in foliar fertilization has increased. However, little research has compared the effects of fertilizer treatment on the ground and the leaves. A combination of soil and foliar sprays should be advised to boost plant production and produce quality.

Foliar fertilizer application is also becoming more used in agricultural crop development since it is more directly targeted and perhaps more eco-friendly (Abadani, et al., 2020). The study "Review of Foliar Feeding in Various Vegetables and Cereal Crops Boosting Growth and Yield Attributes" by Rahman, et al. (2015) revealed that foliar application of macro and micronutrients plays a vital role in the production of good crops and higher yields.

So far, various fertilizers and foliar supplements have been tested in studies to maximize crop growth and yield. For example, fermented banana peel fertilizer was used on pomelo plants (Citrus maxima Merr.) for nutrition via foliar or soil fertilization with potassium. The effect of organic foliar fertilizer or the stimulating effect of hormones on pechay (B. chinensis) was investigated (Fernandez, et al., 2021)

In sustainable farming, bio-fertilizer has been identified as an alternative for increasing soil fertility and crop production. Because of their potential role in food safety and sustainable crop production, the use of beneficial microbes as bio-fertilizers has become critical in the agricultural sector. Bio-fertilizers can be an essential component of integrated nutrient management (Itelima, et al. 2018). One of the most common biofertilizers is vermicompost or also known as vermicast.

Vermicomposting uses worms to convert organic materials (usually wastes) into vermin-compost, a humus-like material (Muralikrishna, et al., 2017). Vermicompost supplements have been shown to improve plant growth on numerous occasions, and these improvements could have been attributed to a rise in the substrate's growing physical, chemical, and biological properties (Terence, et al., 2015). Vermicomposts contain most nutrients in plant-available forms, such as nitrates, phosphates, exchangeable calcium, and soluble potassium (Lim, et al., 2015).

When applied at optimal doses, nitrogenous fertilizer is a good source of nutrients for the soil, implying a positive effect on vegetable growth, development, and yield (Shorna, et al. 2020).

According to Abbas, et al., (2016), using chemical fertilizer in agricultural fields is a primary environmental concern for the long-term growth of plants. As a result, chemical fertilizers have adverse environmental effects on human life, degrading soil fertility and polluting water. Even if synthetic chemicals are used in smaller amounts, they still pose a severe environmental threat. Regardless of the threat posed by synthetic chemicals, crop cultivation remains critical. This compelled scientists to develop fertilizers that can supplement nutrients while also being environmentally friendly (Bosekeng, 2019).

Carbonized rice hull (CRH) is created by partially or entirely burning dried rice hull in a controlled burning process. CRH is a sterile, highly porous, low bulk density material composed of a recalcitrant form of carbon that is less susceptible to microbial decomposition (Rollon, et al. 2018). Carbonized Rice Hull (CRH) is one of the many ingredients to make an excellent potting mix. CRH is the product of partially burned rice hulls, also known as “ipa” in Tagalog. It is used in plant cultivation as a fertilizer and soil conditioner (Medenilla, 2021). It is widely used as a soil conditioner and as the primary component in manufacturing organic fertilizers. It is also used as bedding or absorbent material in poultry, swine, and livestock to facilitate urine and manure collection and to help eliminate foul odor (Sarong, et al., 2015). According to Andal, et al. (2019), organic fertilizer is an excellent source of nutrients for the soil and plants. It aids in the improvement of the soil's physical, biological, and chemical properties.

On the other hand, it also has some disadvantages. Though the crop cut method measures the biological yield, it does not necessarily consider harvest losses and, thus, does not reflect the economic yield used by the farmer or the planner. Crop cuts can be time-consuming and labor-intensive. When crop cuts are used for larger-scale surveys, a clustered sampling procedure is usually used to make fieldwork easier and reduce costs and time. All field tests show that this method tends to overestimate field production (Ahmad, et al., 2016).

Farmers have lost money because they spent too much on fertilizer that was inappropriate for the pechay plant and harvested too little to recoup their investment (Alcala, et al. 2016).

The researchers wanted to determine if there were any effects on the growth and yield of pechay using a growth enhancer solution. It will also provide a solution to the issues faced by our fellow farmers worldwide who desire to harvest high-quality crops. Furthermore, the researchers wanted to explore if a growth enhancer solution could be used as a fertilizer to boost pechay growth and yield.

This study was conducted to investigate the effects of growth enhancer solution on the growth and yield of Pechay (*Brassica rapa)*. Specifically, it sought to answer the following questions: (1) is there a significant effect on the use of the different levels of growth enhancer solution on the growth of pechay? (2) Is there a significant effect on the use of the different levels of growth enhancer solution on the yield of pechay? and, (3) Is the use of the different levels of growth enhancer solution on the growth and yield of pechay can incur less expense?

This study was conducted to determine the effects of growth enhancer solution on the growth and yield of pechay (*Brassica rapa*). Specifically, this study aimed to: (1) determine the effects of the different levels of growth enhancer solution on the growth of pechay, such as on the number of leaves, length of leaves, and width of leaves. (2) determine the effects of the different levels of growth enhancer solution on the yield of pechay in terms of weight in kilograms. and, (3) determine the expenses incurred using the different levels of growth enhancer solution on the growth and yield of pechay.

The following null hypothesis was formulated to guide the researchers to answer the statement of the problem: (1) The use of the different levels of growth enhancers solution has no significant effects on the growth of pechay such as the number of leaves, length of leaves, the width of leaves and weight. (2) The use of the different levels of growth enhancer solution has no significant effects on the yield of pechay. and, (3) The use of the different levels of growth enhancer solution on the growth and yield of pechay do not incur less expense.

This study focused only on the effectiveness of growth enhancer solutions on the growth and yield of pechay (*Brassica rapa*). The research was carried out last June 2021 at La Salud Farm, St. Ezekiel Moreno, Barangay Handumanan, Bacolod City, Negros Occidental, using Randomized Complete Block Design (RCBD). The replication was only up to three (3) because of the limited area provided to the researchers.

This study dramatically values agriculture students, farmers, communities, educators, and future researchers. (1) Farmers will profit from this research since it will inform them about the advantages of available growth enhancer solutions in their farming. They will also learn about the impact of available growth enhancer solution on pechay growth and yield. (2) Agriculture teachers would be inspired to teach other students about available growth enhancer solution and share and implement this research. (3) The outcomes of this study would benefit students greatly because they will be aware of the advantages of taking available growth enhancer solutions. (4) Future researchers interested in enhancing the growth and yield of pechay (*Brassica rapa*) using a growth enhancer solution can use this work as a guide and reference.

METHODOLOGY

This study was entitled “Enhancing the Growth and Yield of Pechay (*Brassica rapa*) using Growth Enhancers Solution” and used an experimental design to determine the effectiveness of the different levels of growth enhancers solution on the growth and yield of pechay. This project determined the effects of different rates of application of growth enhancer solution as fertilizer on the growth and yield of pechay (*Brassica rapa*). In this study, different levels of growth enhancer solution were given following a Randomized Complete Block Design (RCBD). Growth enhancers, according to USDA (2021), are materials that were typically added to soil, plants, or the plant-growth environment to enhance plant growth. Plant growth promoters can boost plant growth through a variety of mechanisms. These include providing supporting nutrients (fertilizers), improving soil condition (for example, adjusting soil pH, improving soil structure and texture, aeration adjustment, and moisture conservation), and controlling or suppressing plant pests. The researcher managed the study's outcome by the time the materials and volunteers were ready.

Around 528 pechay seedlings (*Brassica rapa*) were required for this experiment. This study was conducted at St. Ezekiel Moreno, Brgy. Handumanan, Bacolod City. There were 12 plots for the plantation of pechay (*Brassica rapa*). Four (4) treatments were replicated three (3) times. Each treatment consisted of 44 pechay (*Brassica rapa*) plants. The following were the application rates of growth enhancer solution: T1-Control (water only), T2- 50% (2.5 grams); T3- 100% (5 grams), and T4- 150% (7.5grams).

Each treatment was mixed in 1 liter of water before the application. The amount of treatment applied was divided equally among the number of plants per plot. All data collected in this experiment were subjected to Analysis of Variance (ANOVA) in RCBD using STAR 2.0.1 and Least Significant Difference (LSD).

This study followed a Randomized Complete Block Design (RCBD) with four (4) treatments and three (3) replications. The researchers used pechay (*Brassica rapa*) as the experimental crop for an exploratory study. Moreover, the data gathered were the number of leaves, length, and width of leaves, and weight of pechay (*Brassica rapa*) after the growth enhancer solution was applied.

Randomization was used in this study. According to (Glen, 2016), randomization refers to the process of selecting experimental participants at random. It can also assign treatments to participants randomly by choosing random numbers from a random number table. In this study, randomization was done by dividing the area into three arrays to match the number of replications. Each array was subdivided into four plots to match the four treatments. The numbers drawn from the piece of paper represent the treatment numbers for replications 1, 2, and 3.

This experiment required 12 plots with 44 plants in each plot. The plants were randomly selected from the seed tray and were transplanted into each plot. There were four treatments and three replications. The T1 was the control (water only), T2 was treated with 50% (2.5 grams) of growth enhancer solution, T3 was treated with 100% (5grams) of growth enhancer solution, and T4 was treated with 150% (7.5grams) of growth enhancer solution.

A soil fertility management program must include soil testing. Effective soil testing provides data on soil fertility that can be used to make fertilizer or lime application recommendations. Soil sampling is the first step toward reliable soil testing (Ackerson, 2018). A soil sample was conducted before the land preparation. This study was conducted at St. Ezekiel Moreno Brgy. Handumanan, Bacolod City. Growth and yield of pechay were measured in length and width, the number of leaves, and the weight of pechay. There were four treatments, control (T1), 50% (2.5 grams) of growth enhancer solution (T2), 100% (5 grams) of growth enhancers solution (T3), and 150% (7.5

grams) of growth enhancers solution (T4). Three replications were made using the Randomized Completely Block Design (RCBD).

First, mix the carbonized rice hull (CRH), garden soil, and vermicast. The ratio for this soil medium was 1:1:1. The researchers filled each hole of the seed trays with the mixed soil medium. Then, they put two seeds in every spot in the seed tray and sprinkled a little amount of soil on the top to cover the seed. The researchers moistened the ground in the seed tray.

They then put it in a shaded area inside the house. Second, after 2-3 days, when the seeds show a sign of life, the researchers transferred them into the mini greenhouse in the garden where they can receive sunlight. The greenhouse with plastic prevents a substantial amount of raindrops due to heavy rain. The newly germinated seeds were watered daily. When they already had 2-3 true leaves, they were transplanted into the actual field.

Belgica (2022) states that land preparation is essential for getting the field ready for planting. A well-prepared area keeps weeds at bay, recycles plant nutrients, and provides a soft soil mass for transplanting and a suitable soil surface for direct seeding. The field was plowed, overturned the soil, and broke the soil clod into smaller size. The measurement of the plot was 2m x 2.5m with 0.2 m and 0.4 m. The researchers mixed the soil medium in a process called blanket preparation with a ratio of 1:1. Every plot contained 3.5 kgs of CRH and 3.5 kgs of Vermicompost.

According to (Hartin, 2015), plants that do not get enough water eventually develop water stress. Plants require different amounts of water for optimal growth and development. Plants were watered daily. Twice a day in the morning and afternoon on hot days, while no watering is done during rainy days.

Based on the statement shared by DiTomaso, et al. (2017), a weed management plan must include the detection of new weeds and those that escaped previous control efforts. Identification of weed species is critical, especially at the seedling stage. Growing weeds around the plants were removed immediately to avoid the competition of nutrients. Proper nourishment for the plant was provided by removing the weeds.

According to Gonzaga, et al. (2017), most vegetable crops are heavily influenced by seedling production. There are numerous methods for raising seedlings, including direct seeding, seedboxes, and seedling trays. The seed box and seedling tray methods necessitate transplanting. The pechay seedlings were planted first in a seedling tray and were transplanted after they had 2-3 true leaves, slowly pressed the soil of the seedling, and kept the ground moist most of the time. The plants were watered daily. Twice during hot days and were not watered during rainy days.

Each treatment was mixed in 1 liter of water before the application. The amount of treatment applied was divided equally among the number of plants per plot.

The researchers applied the treatment the day before our transplant. For the next five days after the transplant, they gathered data and used it for another treatment. There were five days before we collected data and applied the treatment. The gathering of data was done in the morning, while the application of the treatment was made in the afternoon on the same day.

RESULTS, DISCUSSIONS, AND IMPLICATIONS

The following results present the growth and yield of pechay (*Brassica rapa*). Pechay development are measured in terms of the number of leaves, length of leaves, and width of leaves. The yield of pechay is measured in terms of weight in kilograms. Results show the incurred expenses incurred using the different levels of growth enhancer solution on the growth and yield of pechay (Brassica rapa).

It is worth noting that the results presented below are based on researchers' observations over twenty-seven days, beginning with the first application of treatment. Data were gathered at an interval of five days.

Data gathered were computed and subjected to Analysis of Variance (ANOVA) in CRD using STAR 2.0.1, and Least Significant Difference (LSD) was used to determine significant differences among treatments.

On the average number of leaves of pechay, the statistical analysis revealed that the application of different levels of growth enhancer solution does not significantly influence the number of leaves of pechay from day five to day twenty-five of observation. It was noted that the number of leaves of pechay approximately reached three to four leaves across all treatments from day five to day ten of observance. On day fifteen and day twenty, the number of leaves of pechay in all treatments ranged from five to six. On the final day of observation, the number of leaves of pechay reached around eight in all treatments.

The average length of leaves of pechay was measured. The results showed that applying the different levels of growth enhancer solution does not significantly influence the length of leaves of pechay from day five to day twenty-five of observation. Numerically, the most extended leaves with an average length of 21.07mm on day five were obtained from plots treated with 2.5 grams of growth enhancer solution (Treatment 2). It was followed by the group of control with the application of water only (Treatment 1) with an average of 20.97mm and 20.13 mm from the plants treated with 5.0 grams of growth enhancer solution (Treatment 3). On the other hand, plants that were treated with 7.5 grams of growth enhancer solution (Treatment 4) got the shortest leaves at 19.13mm.

On day ten of observation, plants under the group of control with the application of water only (Treatment 1) got the most extended leaves at 26.37. It was followed by the application of 2.5 grams of growth enhancer solution (Treatment 2) with an average of 24.93mm, and 22.83mm length of leaves from plants treated with 7.5 grams of growth enhancer solution (Treatment 4). Pechay plants under 5.0 grams of growth enhancers solution (Treatment 3) got the shortest leaves of 22.70mm on day ten of observation.

On day fifteen and day twenty of observation, pechay plants under the control group with the application of water only (Treatment 1) maintained to have the longer leaves over other treatments, which got an average of 40.63- and 62.53mm. This was followed by plants treated with 2.5 grams of growth enhancer solution (Treatment 2), which attained an average of 39.23- and 56.33mm, respectively. Plants with 5.0 grams of growth enhancer solution (Treatment 3) obtained an average of 35.33- and 52.60-mm length of leaves. While the shortest leaves of pechay plants were observed from plots under 7.5 grams of growth enhancers solution (Treatment 4) with an average of 34.77- and 49.83mm leaves on day fifteen and day twenty of observation.

Lastly, the most extended leaves of pechay observed on day twenty-five with an average of 87.17 mm was, noted from plots under the group of control with the application of water only (Treatment 1), which was followed by plants treated with 2.5 grams of growth enhancers solution (Treatment 2) with an average length of 77.10mm. Pechay under 5.0 grams of growth enhancer solution (Treatment 3) got an average length of 72.27mm, while the shortest leaves of 69.67mm were obtained from plants treated with 7.5 grams of growth enhancers solution (Treatment 4).

When it comes to the average width of leaves of pechay, the results showed that the application of different levels of growth enhancer solution does not significantly influence the width of leaves of pechay from day five to day twenty-five of observation. On the day five of observance, the broadest leaves with an average value of 14.50mm were obtained from plots treated with 2.5 grams of

growth enhancer solution (Treatment 2), which was followed by the control group with the application of water only (Treatment 1) with an average of 14.03mm. Pechay plants treated with 5.0 grams of growth enhancer solution (Treatment 3) got an average of 13.63mm, while plants with 7.5 grams of growth enhancers solution (Treatment 4) obtained 13.30mm. On the other hand, plants treated with 7.5 grams of growth enhancer solution (Treatment 4) got the smallest width of 13.30mm.

On day ten and day fifteen of observation, pechay plants under the control group with water application only (Treatment 1) attained the broadest leaves of 16.67mm and 28.60mm, respectively. This was followed by plants treated with 2.5 grams of growth enhancer solution (Treatment 2), which obtained an average width of 15.57mm and 28.50mm. Pechay plants under 7.5 grams of growth enhancers solution (Treatment 4) got an average width of 14.97mm and 24.50mm, while the smallest width of 14.07mm and 23.93mm were observed from plants under 5.0 grams of growth enhancer solution (Treatment 3).

Furthermore, on day twenty and day twenty-five of observation, pechay plants under the control group with water application only (Treatment 1) got the broadest leaves of 45.30mm and 60.67mm, respectively. This was followed by plants treated with 2.5 grams of growth enhancer solution (Treatment 2), which attained an average width of 40.53mm and 55.10mm. Application of 5.0 grams of growth enhancer solution (Treatment 3) reached an average width of 36.70mm and 52.47mm, smallest leaves of 35.07mm and 49.77mm were observed from plots applied with 7.5 grams of growth enhancer solution (Treatment 4).

In tons/ha of pechay, the statistical analysis revealed that applying different levels of growth enhancer solution does not significantly affect the yield of pechay.

However, the highest yield of 3.80 tons/ha was observed from the application rate of 5.0 grams of growth enhancers solution (Treatment 3). Plants followed this under the control group with the application of water only (Treatment 1), which obtained an average yield of 1.95 tons/ha and 1.71 tons/ha from plants applied with an application rate of 7.5 grams of growth enhancer solution (Treatment 4). On the other hand, the lowest yield of 1.67 tons/ha was observed from the application rate of 2.5 grams of growth enhancers solution (Treatment 2).

In the discussion, of the expenses incurred during the experiment, the maximum total cost of 398.00 pesos was obtained from the application of 7.5 grams of growth enhancer solution (Treatment 4). It is followed by a total cost of 330.50 pesos from 5.0 grams of growth enhancers solution (Treatment 3), 263.00 pesos from 2.5 grams of growth enhancers solution (Treatment 2), and 195.50 pesos from control (water only) (Treatment 1).

The total cost of materials for each treatment was 96.75 pesos. The materials include seeds and seedling trays. At the same time, the labor cost for each treatment was 98.75 pesos. The cost of the growth enhancer solution for the control group (Treatment 1) was 0.00 pesos because it uses water only, followed by the application rate of 2.5 grams of growth enhancers solution (Treatment 2), which cost 67.50 pesos. On the other hand, the application rate of 5.0 grams of growth enhancer solution (Treatment 3) costs 135.00 pesos. Lastly, the application rate of 7.5 grams of growth enhancer solution (Treatment 4) costs 202.50 pesos. The higher the application rate of the growth enhancer solution also means the higher costs of expense.

The results of this experiment generally show that the growth and yield of pechay are not affected by the growth enhancer solution used in this study. The researchers would like to emphasize that not all growth enhancer solutions are not adequate for the growth and yield of pechay (Brassica rapa). This study conforms with the study of Prado (2015) entitled, "Effect of Organic Fertilizer on the Growth Performance Brassica rapa Under La Union, Philippines." According to her conclusion,

the application of vermicompost, really plain compost, and urea primarily did not affect plant height, leaf area length, or the number of literally subtly leaves per plant. Similarly, the application of vermicompost, very plain compost, and urea, for the most part, did not affect, for all intent and purposes, yield parameters particularly such as weight of marketable leaves and plants, number of commercial leaves, and the occurrence of insect pest infestation, which is relatively significant. For a more appealing appearance, use sort of natural botanical pesticides to, for all intent and purposes, prevent insect pest infestation of vermicompost fertilized pechay plants, which is quite significant. Increase the promotion of vermicompost fertilizer as a climate change mitigation tool. Finally, the success of organic farming necessitates a timetable of interdisciplinary collaborations among research institutions, vigorous advocacy, and determined leadership.

CONCLUSIONS AND RECOMMENDATIONS

The study aimed to evaluate the efficacy of different levels of growth enhancer solutions to the growth and yield of pechay (*Brassica rapa*). Specifically, it intends to: (1) determine the effects of different levels of growth enhancer solution on the growth of pechay, such as the number, length, and width of leaves; (2) determine the effects of different levels of growth enhancer solution on the yield of pechay; and (3) determine the expense incurred of growth enhancers solution applied to pechay. The study was conducted at La Salud Farm, St. Ezekiel Moreno, Barangay Handumanan, Bacolod City, Negros Occidental last June 2021.

The study was laid out in Randomized Complete Block Design (RCBD), consisting of four (4) treatments with three (3) replications. Different levels of growth enhancer solution (GES) treatments were diluted to 1liter of water. The treatments were as follows: T1 – Control (water only); T2 – 2.5 grams of growth enhancer solution; T3 – 5.0 grams of growth enhancers solution; and T4 – 7.5 grams of growth enhancer solution. Data gathered were computed and subjected to Analysis of Variance (ANOVA) in RCBD using STAR 2.0.1, and Least Significant Difference (LSD) was used to determine significant differences among treatments.

Statistical analysis revealed that the application of different levels of growth enhancer solution does not significantly influence the growth and yield of pechay in terms of the number, length, and width of leaves and yield. But numerically, it was noted that pechay under the control group with the application of water only (T1) obtained the most numbered leaves with a leaf count of 8.10, most extended leaves with an average length of 87.17mm, and broadest leaves with an average width of 60.67mm at the final day of observation. On the other hand, the highest yield of 3.80 tons/ha was attained from pechay plants grown under 5.0 grams of growth enhancers solution GES (T3). Moreover, pechay plants under control obtained the lowest total cost of 195.50.

From the above statistical results, the researchers came up with the following conclusion. Hence, the null hypotheses are all accepted. First, the different levels of growth enhancer solution have no significant effects on the growth of pechay, such as the number of leaves, length of leaves, width of leaves, and weight. Second, the different levels of growth enhancer solution have no significant effects on the yield of pechay. Lastly, the different levels of growth enhancer solution on the growth and the yield of pechay do not incur less expense.

Based on the results of statistical analysis, the use of different levels of growth enhancer solution does not significantly influence the growth and yield of pechay. However, based on the result in numerical order, the researchers consider the following: (1) This study recommends that without the use of a growth enhancer solution, the growth and yield of pechay is not affected. (2) This study recommends that using a growth enhancer solution does not incur less expense. (3) It is also recommended that more future studies should be done to enhance this research.

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